APPENDIX ‘F’

GEOTECHNICAL REPORT

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February 23, 2016

Mr. Kevin Rae
AECOM Canada Ltd.
99 Commerce Drive
Winnipeg, Manitoba
R3P 0Y7

Dear Mr. Rae:

Project No: 60481153 (402)

Regarding: Local Streets Package 16-R-06 – Contract 2 – Geotechnical Summary

This report summarizes the results of the subsurface investigation completed for the proposed 2016 Local Street Renewals of Olive Street, Rowand Avenue, Burnell Street, Toronto Street and Borehamn Boulevard. The objective of the investigation is to provide information related to the existing pavement and soil stratigraphy underneath.

One test hole (TH16-01) was drilled on Olive Street, five test holes (TH16-03 to TH16-08 not including TH16-06) along Rowand Avenue, four test holes (TH16-09 to TH16-12) along Burnell Street, four test holes (TH16-13 to TH16-16) along Toronto Street and four test holes (TH16-17 to TH16-20) along Boreham Boulevard. The approximate location of the test holes are shown on Figures 01 to 05 in Appendix A. Two test holes planned for Olive Street (TH16-02 and TH16-03) and one test hole planned for Rowand Avenue (TH16-06) were unable to be drilled due to overhead power lines at these locations.

Pavement coring was completed using a hollow 150 mm diameter diamond core drill bit. Core samples were recovered and logged at AECOM's Materials Laboratory. Photos of core samples are included in Appendix A.

The test hole drilling was completed by Maple Leaf Drilling Ltd. using a truck mounted drill rig equipped with 125 mm diameter solid stem augers. The test holes were advanced to a depth of 2.1 m below road surface. During the drilling, AECOM personnel observed subsurface conditions and visually classified the soil samples. Other pertinent information such as groundwater and drilling conditions were also recorded. Disturbed soil samples from auger cuttings retrieved during the field investigation were transported to AECOM's Materials Laboratory for further testing and classification.

The laboratory soil testing consisted of Moisture Content determination, Atterberg Limits and Grain Size Distribution tests. The test results are recorded on the test hole logs and in the laboratory testing summary Table 01, both included in Appendix A.

Sincerely,
AECOM Canada Ltd.

Aaron Kaluzniak, EIT
Geotechnical Engineering

Reviewed by:

Zeyad Shukri, M.Sc., P.Eng.
Senior Geotechnical Engineer

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- represents Consultant's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to Consultant which has not been independently verified;
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AECOM: 2012-01-06

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GENERAL STATEMENT

NORMAL VARIABILITY OF SUBSURFACE CONDITIONS

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

EXPLANATION OF FIELD & LABORATORY TEST DATA

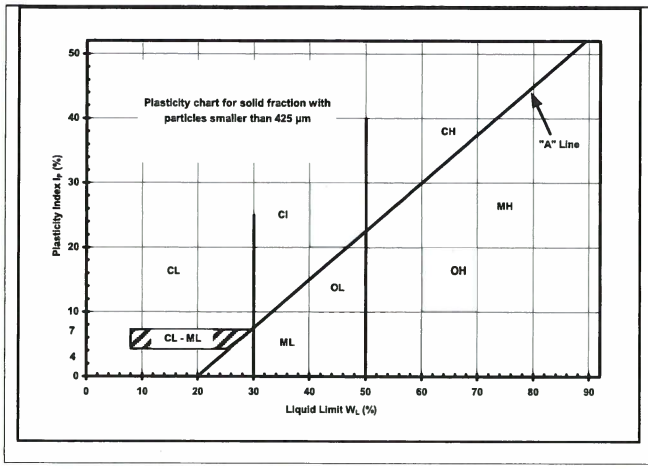
Description				UMA Log Symbols	USCS Classification	Laboratory Classification Criteria			
						Fines (%)	Grading	Plasticity	Notes
COARSE GRAINED SOILS	GRAVELS (More than 50% of coarse fraction of gravel size)	CLEAN GRAVELS (Little or no fines)	Well graded gravels, sandy gravels, with little or no fines		GW	0-5	$C_U > 4$ $1 < C_C < 3$		Dual symbols if 5-12% fines. Dual symbols if above "A" line and $4<W_P<7$ $C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$
			Poorly graded gravels, sandy gravels, with little or no fines		GP	0-5	Not satisfying GW requirements		
		DIRTY GRAVELS (With some fines)	Silty gravels, silty sandy gravels		GM	> 12		Atterberg limits below "A" line or $W_P<4$	
			Clayey gravels, clayey sandy gravels		GC	> 12		Atterberg limits above "A" line or $W_P<7$	
	SANDS (More than 50% of coarse fraction of sand size)	CLEAN SANDS (Little or no fines)	Well graded sands, gravelly sands, with little or no fines		SW	0-5	$C_U > 6$ $1 < C_C < 3$		
			Poorly graded sands, gravelly sands, with little or no fines		SP	0-5	Not satisfying SW requirements		
		DIRTY SANDS (With some fines)	Silty sands, sand-silt mixtures		SM	> 12		Atterberg limits below "A" line or $W_P<4$	
			Clayey sands, sand-clay mixtures		SC	> 12		Atterberg limits above "A" line or $W_P<7$	
FINE GRAINED SOILS	SILTS (Below 'A' line negligible organic content)	$W_L<50$	Inorganic silts, silty or clayey fine sands, with slight plasticity		ML			Classification is Based upon Plasticity Chart	
		$W_L>50$	Inorganic silts of high plasticity		MH				
	CLAYS (Above 'A' line negligible organic content)	$W_L<30$	Inorganic clays, silty clays, sandy clays of low plasticity, lean clays		CL				
		$30<W_L<50$	Inorganic clays and silty clays of medium plasticity		CI				
		$W_L>50$	Inorganic clays of high plasticity, fat clays		CH				
	ORGANIC SILTS & CLAYS (Below 'A' line)	$W_L<50$	Organic silts and organic silty clays of low plasticity		OL				
		$W_L>50$	Organic clays of high plasticity		OH				
HIGHLY ORGAINIC SOILS			Peat and other highly organic soils		Pt	Von Post Classification Limit		Strong colour or odour, and often fibrous texture	

	Asphalt		Till		
	Concrete		Bedrock (Undifferentiated)		AECOM
	Fill		Bedrock (Limestone)		

When the above classification terms are used in this report or test hole logs, the designated fractions may be visually estimated and not measured.

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER, 2015)

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATIONS REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER, 2015)



FRACTION		SEIVE SIZE (mm)		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
		Passing	Retained	Percent	Identifier
Gravel	Coarse	76	19	35-50	and
	Fine	19	4.75		
Sand	Coarse	4.75	2.00	20-35	"y" or "ey" *
	Medium	2.00	0.425		
	Fine	0.425	0.075	10-20	some
Silt (non-plastic) or Clay (plastic)		< 0.075 mm		1-10	trace

* for example: gravelly, sandy clayey, silty

Definition of Oversize Material

COBBLES: 76mm to 300mm diameter
BOULDERS: >300mm diameter

LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

- q_u - undrained shear strength (kPa) derived from unconfined compression testing.
- T_v - undrained shear strength (kPa) measured using a torvane
- pp - undrained shear strength (kPa) measured using a pocket penetrometer.
- L_v - undrained shear strength (kPa) measured using a lab vane.
- F_v - undrained shear strength (kPa) measured using a field vane.
- γ - bulk unit weight (kN/m^3).
- SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.
- DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.
- w - moisture content (W_L, W_P)

The undrained shear strength (Su) of a cohesive soil can be related to its consistency as follows:

Su (kPa)	CONSISTENCY
<12	very soft
12 – 25	soft
25 – 50	medium or firm
50 – 100	stiff
100 – 200	very stiff
200	hard

The resistance (N) of a non-cohesive soil can be related to compactness condition as follows

N – BLOWS/0.30 m	COMPACTNESS
0 - 4	very loose
4 - 10	loose
10 - 30	compact
30 - 50	dense
50	very dense

F3. GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER 2015)

F3.1 Fieldwork

(a) Clear all underground services at each test-hole location.

(b) On most projects, test-holes are required every 50 metres with a minimum of three (3) test holes per Project Location. For street projects greater than 500 metres, test holes may be taken every 100 m. More or fewer test-holes may be required depending upon known Site conditions – confirm with the Project Manager.

(c) Record location of test-hole (offset from curb, distance from cross street and house number).

(d) Drill 150 mm-diameter cores in pavement.

(e) Drill 125 mm-diameter test-holes into fill materials and subgrade.

(f) If a service trench backfilled with granular materials is encountered, another hole shall be drilled to define the existing sub-surface conditions.

(g) Test-holes shall be drilled to depth of 2 m ±150 mm below surface of the pavement.

(h) Recover pavement core sample and representative samples of soil (fill materials, pavement structure materials and subgrade).

(i) Measure and record pavement section exposed in the test-hole (thickness of concrete or asphalt and different types of pavement structure materials).

(j) Pavement structure materials to be identified as crushed limestone or granular fill and the maximum aggregate size of the material (20 mm, 50 mm or 150 mm).

(k) Log soil profile for the subgrade.

(l) Representative samples of soil must be obtained at the following depths below the bottom of the pavement structure materials – 0.1 m, 0.4 m, 0.7 m, 1.0 m, 1.3 m, 1.6 m, etc. Ensure a sample is obtained from each soil type encountered in the test-hole.

(m) Make note of any water seepage into the test-hole.

(n) Backfill test-hole with native materials and additional granular fill, if required. Patch pavement surface with hot mix asphalt or high strength durable concrete mix.

(o) Return core sample from the pavement and soil samples to the laboratory.

F3.2 Lab Work

(a) Test all soil samples for moisture content.

(b) Photograph core samples recovered from the pavement surface.

(c) Conduct tests for plasticity index and hydrometer analysis on selected soil samples which are between 0.5 m and 1 m below top of pavement (this is the sub-grade on which the pavement and sub-base will be built). The selection will be based upon visual classification and moisture content test results, with a minimum of one sample of each soil type per street to be tested.

(d) Prepare test-hole logs and classify subgrade (based on hydrometer) as follows:

< 30% silt	- classify as clay
30% - 50% silt	- classify as silty clay
50% - 70% silt	- classify as clayey silt
> 70% silt	- classify as silt

(e) For Pavement Rehabilitations and Mill and Fill Pavement Rehabilitation Method pavement cores may be required. Contact the City's Project Manager to confirm requirements.

(f) For any uncertain situations and/or locations, or clarification of these requirements, contact the Project Manager.

Appendix A

- Test Hole Location Plans

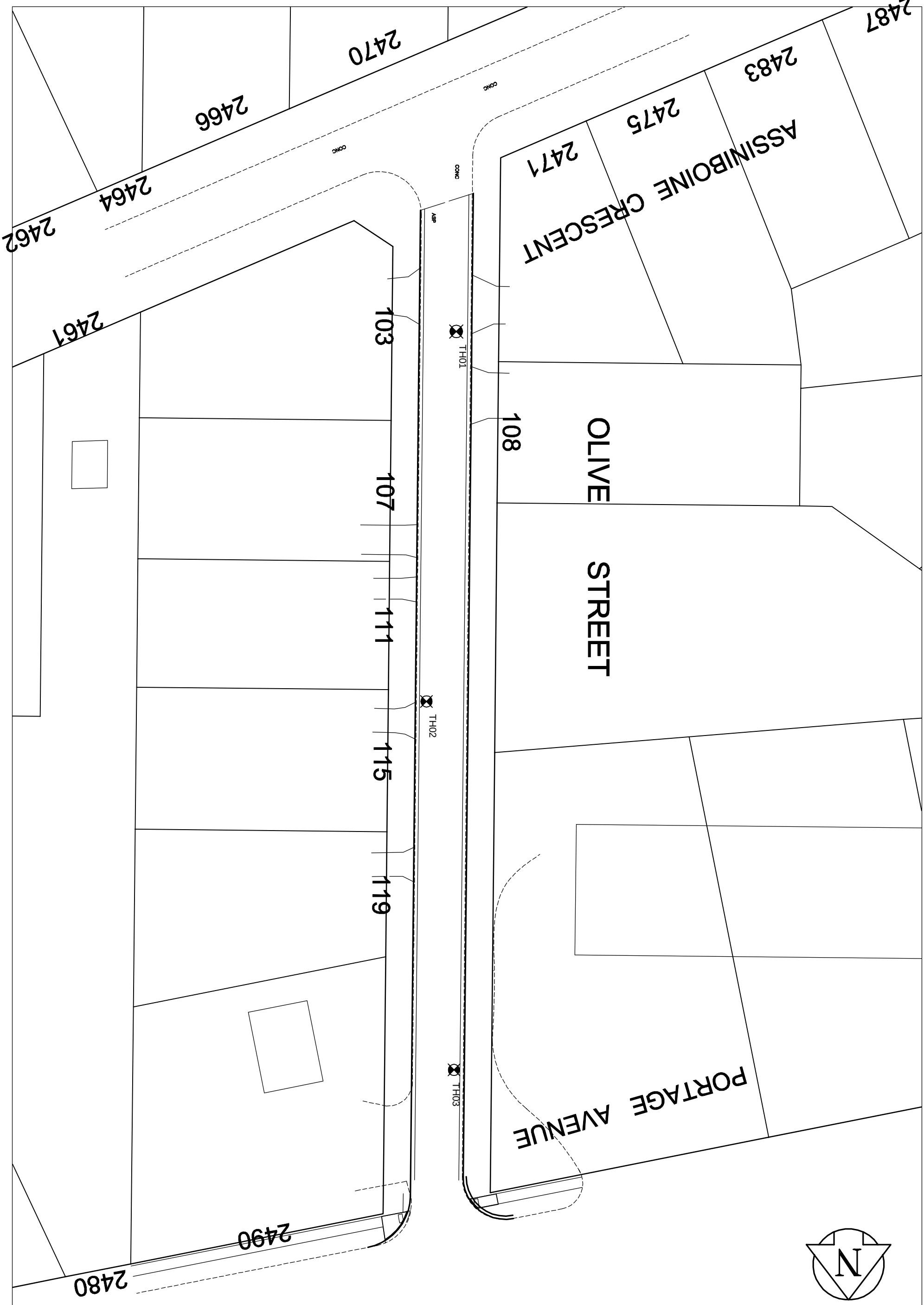
- Test Hole Logs

- Summary of Laboratory Soil Testing

- Pavement Core Photographs

Last saved by: TORPEYR (2016-02-16) Last Plotted: 2016-02-16
Filename: P:\60481153\900-WORK\910-CAD\20-SHEETS\C\OLIVE\REF-IN\60481153-FIG-01-OLIVE_2016.DWG

Project Management Initials: Designer: ____ Checked: ____ Approved: ____ ANSI B 279.4mm x 431.8mm



2015 Local Streets Package
Olive Street
City of Winnipeg

FIGURE 01: TEST HOLES LOCATION PLAN

AECOM

Last saved by: CAPPELLOJ(2016-01-05) Last Plotted: 2016-01-06
Filename: P:\60481153\900-WORK\910-CAD\20-SHEETS\C\ROWAND\REF-IN\60481153-FIG-02-ROWAND_2016.DWG

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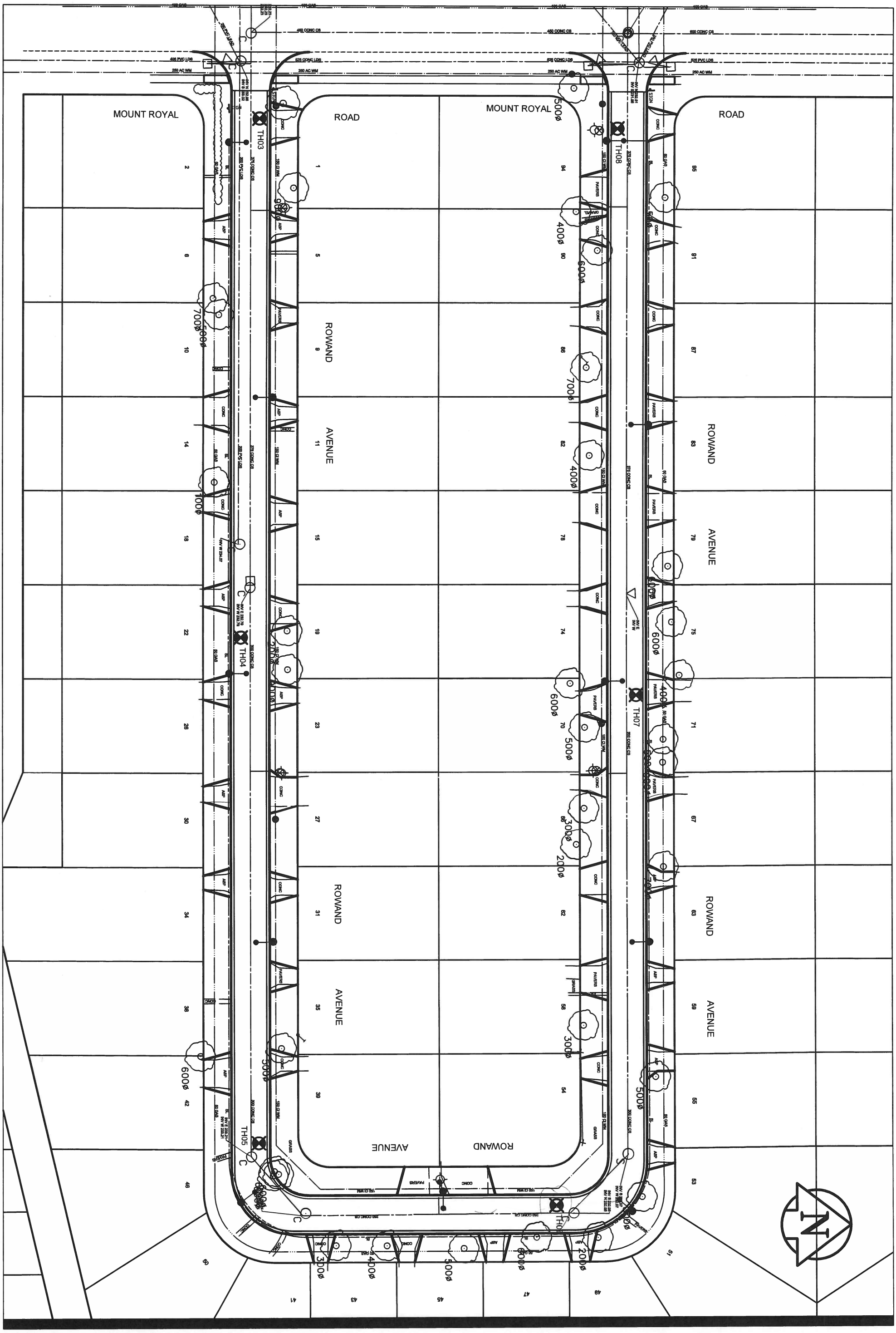

2015 Local Streets Package
Rowand Avenue
City of Winnipeg

FIGURE 02: TEST HOLES LOCATION PLAN

AECOM

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Filename: P:\60481153\900-WORK\910-CAD\20-SHEETS\C\BURNELL\REF-IN\60481153-FIG-03-BURNELL_2016.DWG

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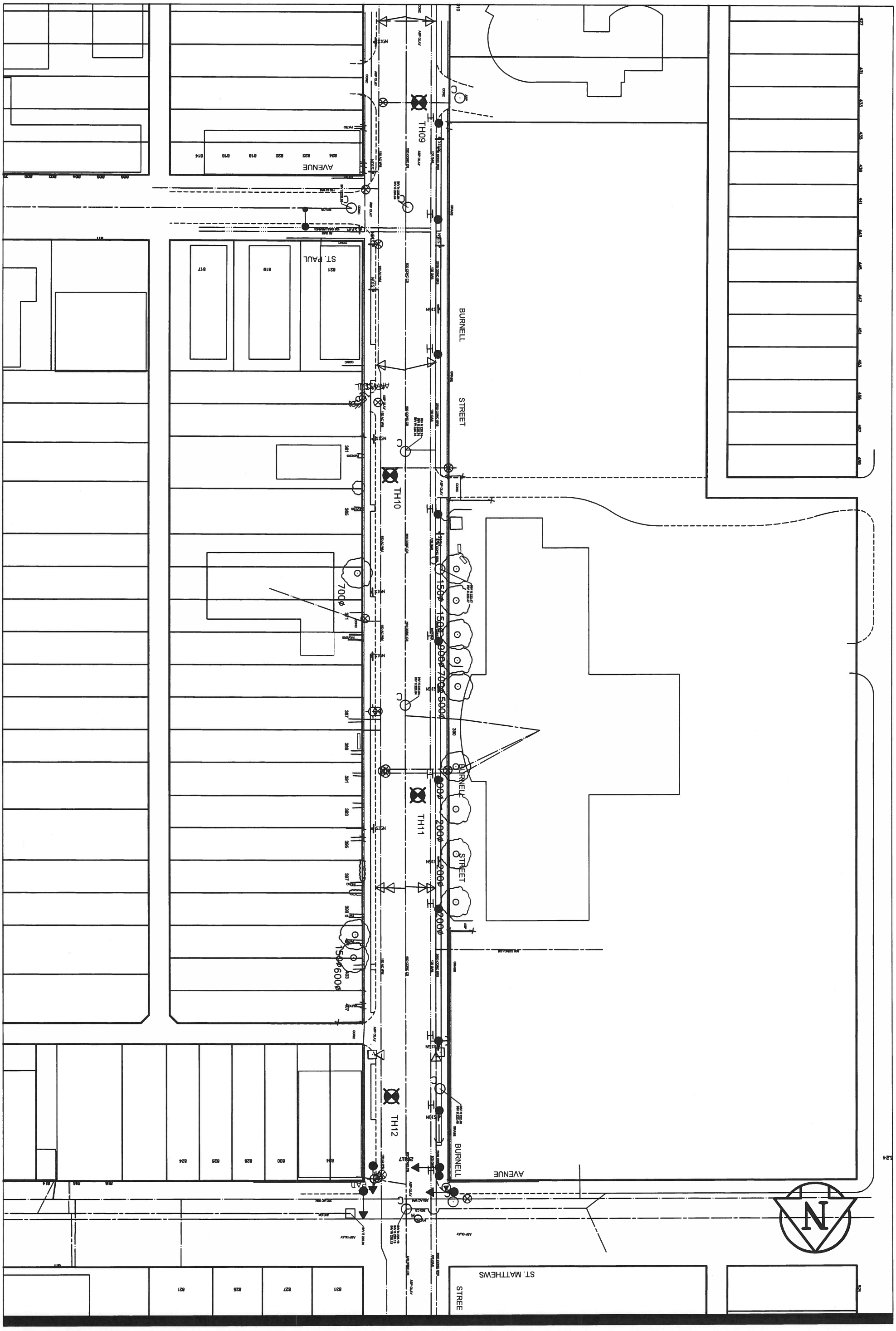


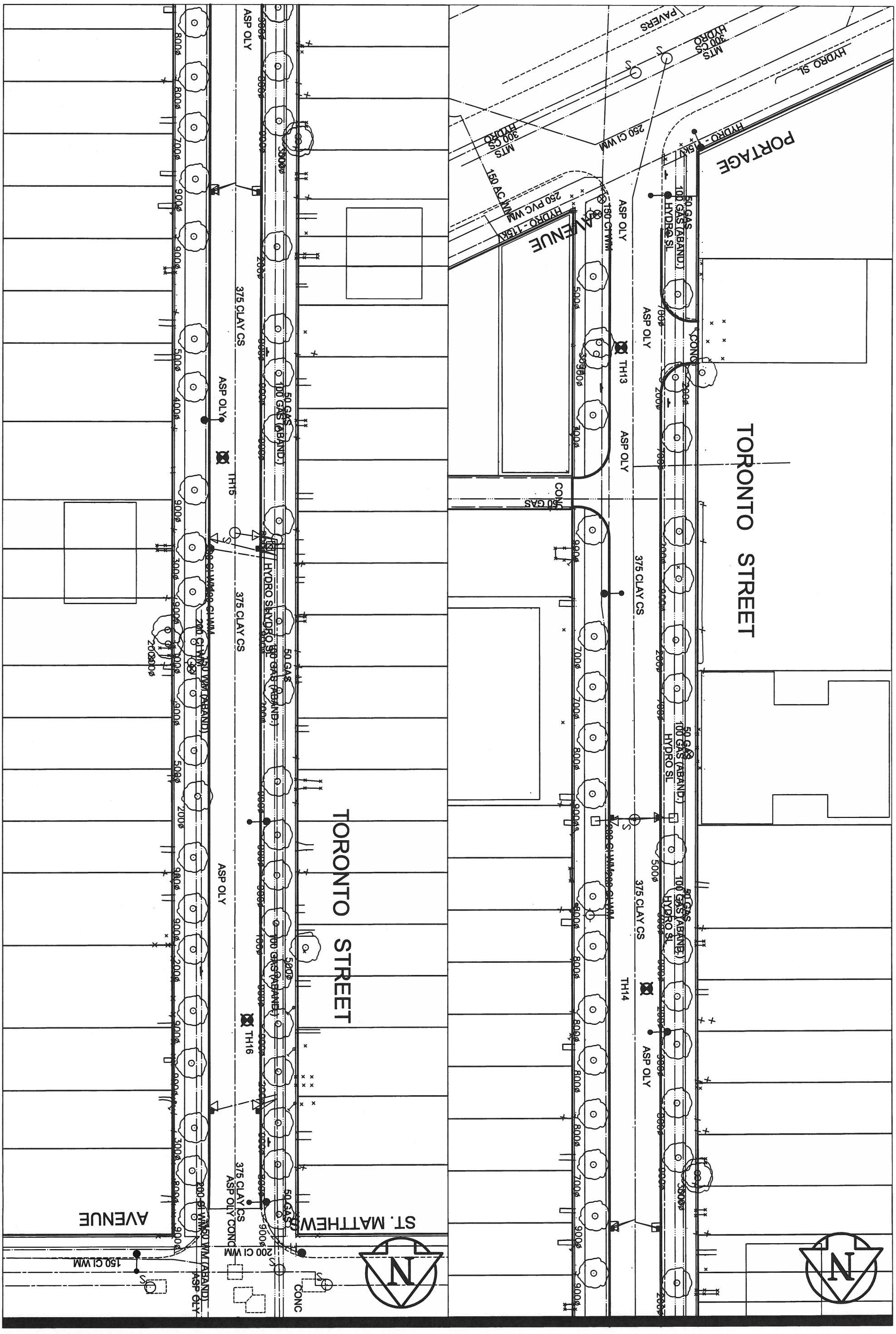
2015 Local Streets Package
Burnell Street
City of Winnipeg

FIGURE 03: TEST HOLES LOCATION PLAN

AECOM

Last saved by: COCKRELLB(2016-01-06) Last Plotted: 2016-01-06
Filename: P:\60481153\900-WORK\910-CAD\20-SHEETS\C\TORONTO\REF-IN\60481153-FIG-04-TORONTO_2016-1.DWG

Project Management Initials: Designer: ____ Checked: ____ Approved: ____ ANSI B 279.4mm x 431.8mm



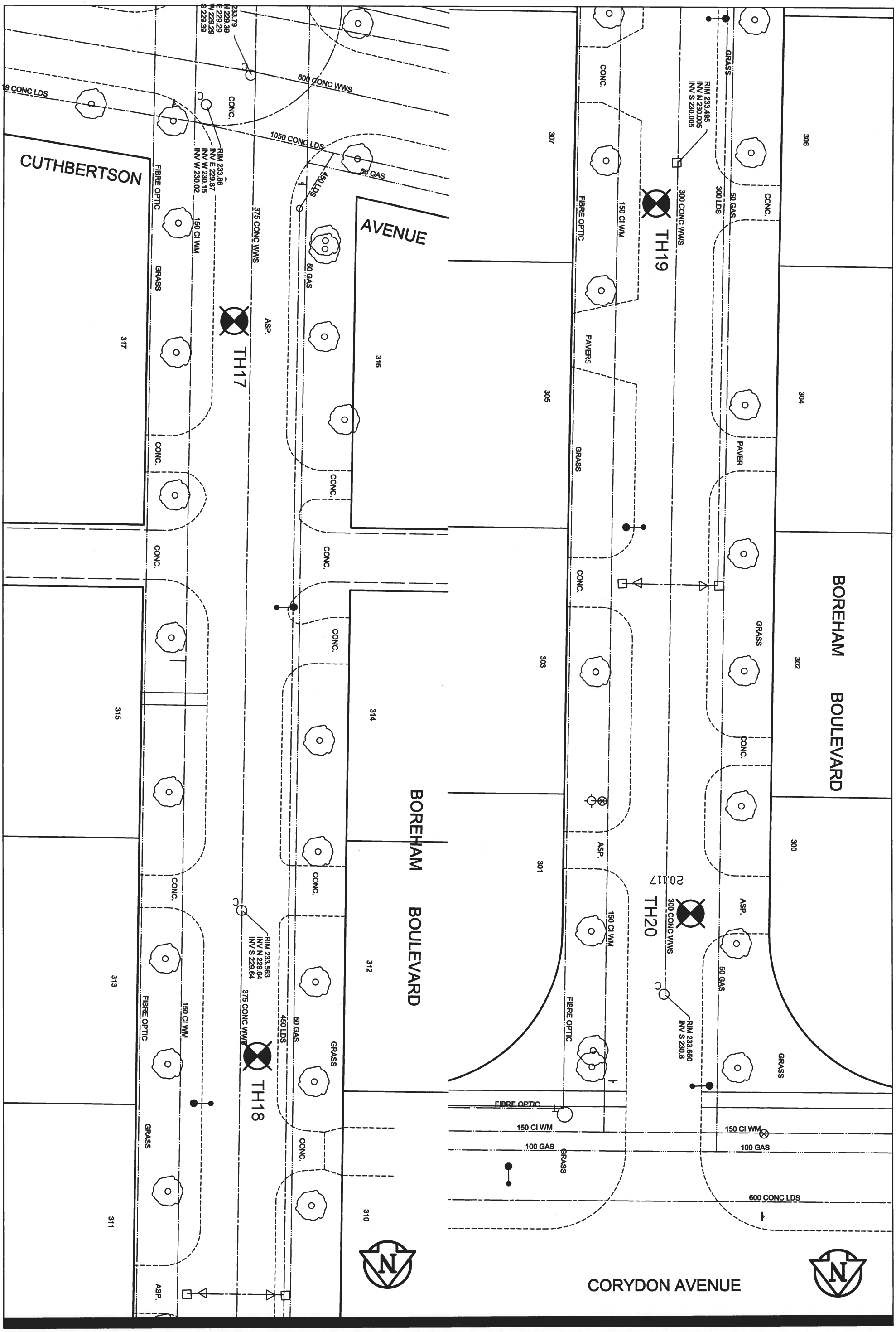
2015 Local Streets Package
Toronto Street
City of Winnipeg

FIGURE 04: TEST HOLES LOCATION PLAN

AECOM

Last saved by: CAPPELLOJ(2016-01-05) Last Plotted: 2016-01-06
Filename: P:\60481153\900-WORK\910-CAD\20-SHEETS\C\BOREHAM\REF-IN\60481153-FIG-05-BOREHAM_2016.DWG

Project Management Initials: Designer: ____ Checked: ____ Approved: ____ ANSI B 279.4mm x 431.8mm



2015 Local Streets Package
Boreham Boulevard
City of Winnipeg

FIGURE 05: TEST HOLES LOCATION PLAN

AECOM

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-01**
LOCATION: Olive Street; 20 m N of Assiniboine Crescent, 2 m E of W Curb, #103 Olive Street		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ☒ SPLIT SPOON ▬ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (50 mm)					
		Concrete (150 mm)					
		SILTY CLAY - trace sand - brown, moist - high plasticity		G57			
				G58		(G58): Gravel: 0.5%, Sand: 12.2%, Silt: 31.9%, Clay: 55.4%	
				G59			
1		- frozen to 0.9 m - firm below 0.9 m					1
				G60			
				G61			
				G62			
2		- higher content of silt observed below 1.8 m					2
				G63		(G63): Gravel: 0.0%, Sand: 10.6%, Silt: 37.0%, Clay: 52.4%	
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					
3							

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☘ Field Vane ☘ (kPa) 50 100 150 200

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

AECOM

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-03**
LOCATION: Rowand Avenue (South Leg), at Mount Royal Road, North Lane, #1 Rowand Avenue		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	DEPTH
0		Asphalt (50 mm)				
		Concrete (100 mm)				
		CLAY - some silt, trace sand - brown, moist - high plasticity		G64		
				G65		
				G66		
1		- frozen to 0.9 m - firm below 0.9 m, becoming soft with increasing depth				1
				G67		
				G68	(G68): Gravel: 0.0%, Sand: 5.2%, Silt: 16.1%, Clay: 78.7%	
				G69		
2						2
				G70		
3		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.				

PENETRATION TESTS: ✳ Becker ✳ | ◇ Dynamic Cone ◇ | ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 | ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 | Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + | × QU/2 × | □ Lab Vane □ | △ Pocket Pen. △ | ☢ Field Vane ☢ (kPa) 50 100 150 200

AECOM	LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
	REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
	PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-04**
LOCATION: Rowand Avenue (South Leg), 120 m E of Mount Royal Road, South Lane, #19 Rowand Avenue		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ⊠ SPLIT SPOON ▤ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (35 mm) Concrete (115 mm)					
		GRAVEL and SAND - some silt, trace clay - brown, dry, frozen - non plastic		G71		(G71): Gravel: 48.1%, Sand: 37.4%, Silt: 10.9%, Clay: 3.6%	
		CLAY - silty, trace silt inclusions, trace sand - brown, moist - intermediate to high plasticity		G72			
				G73			
1		- frozen to 0.9 m - firm below 0.9 m		G74			1
				G75			
				G76			
2				G77			2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					
3							

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☢ Field Vane ☢ (kPa) 50 100 150 200

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-05**
LOCATION: Rowand Avenue (South Leg), 230 m E of Mount Royal Road, North Lane, #39 Rowand Avenue		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ⊠ SPLIT SPOON ▬ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (35 mm) Concrete (115 mm)					
		GRAVEL - sandy, trace silt, trace clay - brown, dry to moist, frozen		G78			
		CLAY - silty, trace sand - brown, moist - intermediate to high plasticity		G79			
1		- frozen to 0.9 m - firm below 0.9 m		G80			1
				G81			
				G82			
2				G83			2
				G84			
3		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☢ Field Vane ☢ (kPa) 50 100 150 200

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-07**
LOCATION: Rowand Avenue (North Leg), 140 m E of Mount Royal Road, North Lane, #71 Rowand Avenue		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ▨ SPLIT SPOON ▤ BULK ▨ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (35 mm) Concrete (150 mm)					
		CLAY - some silt, some sand - black, moist - high plasticity		G85		(G85): Gravel: 0.0%, Sand: 10.6%, Silt: 13.5%, Clay: 75.9%	
				G86			
		- frozen to 0.9 m - firm below 0.9 m		G87			
1				G88			1
		- brown below 1.4 m		G89			
				G90			
2				G91			2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					
3							

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☢ Field Vane ☢ (kPa) 50 100 150 200

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

AECOM

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-08**
LOCATION: Rowand Avenue (North Leg), at Mount Royal Road, South Lane, #95 Rowand Avenue		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ☒ SPLIT SPOON ▬ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100; ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100	UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⛢ Field Vane ⛢ (kPa) 50 100 150 200	COMMENTS	DEPTH
0		Concrete (180 mm)						
		SAND and GRAVEL - silty - brown, dry, frozen		G92	●			
				G93	●			
		CLAY - silty, trace sand - brown, moist - intermediate plasticity		G94	●			
1		- frozen to 0.9 m - firm below 0.9 m		G95	●			1
				G96	●			
				G97	●			
		- trace silt inclusions below 1.8 m		G98	●			
2		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.						2
3								

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-09**
LOCATION: Burnell Street, 30 m S of St. Paul Avenue, West Lane, Kivalliq Inuit Centre		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ☒ SPLIT SPOON ▬ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (125 mm)					
		Concrete (150 mm)					
		GRAVEL - silty, sandy, trace clay - brown, moist, frozen		G1			
		CLAY - trace silt, trace sand - dark brown, moist - high plasticity		G2			
				G3			
1		- frozen to 1.1 m - firm below 1.1 m		G4			1
				G5			
				G6			
2				G7		(G7): Gravel: 0.0%, Sand: 1.3%, Silt: 5.8%, Clay: 92.9%	2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					
3							

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100; ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☢ Field Vane ☢ (kPa) 50 100 150 200

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/19/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

AECOM

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-10**
LOCATION: Burnell Street, 60 m N of St. Paul Avenue, East Lane, #361 Burnell Street		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ⊠ SPLIT SPOON ▤ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (60 mm)					
		Concrete (170 mm)					
		GRAVEL - sandy, clayey, trace silt - brown, moist, frozen		G8			
		SILTY CLAY - trace sand - brown, moist - intermediate plasticity		G9			
				G10			
1		- frozen to 1.1 m - firm below 1.1 m		G11			1
				G12			
		- increasing moisture with increasing depth - becoming soft with increasing depth		G13			
2				G14			2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					
3							

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☢ Field Vane ☢ (kPa) 50 100 150 200

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/19/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

AECOM

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-11**
LOCATION: Burnell Street, 90 m S of St. Matthews Avenue, West Lane, #391 Burnell Street		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

PENETRATION TESTS: ✳ Becker ✳ | ◇ Dynamic Cone ◇ | ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 | ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 | Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + | × QU/2 × | □ Lab Vane □ | △ Pocket Pen. △ | ✤ Field Vane ✤ (kPa) 50 100 150 200

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	DEPTH
0		Asphalt (100 mm)				
		Concrete (180 mm)				
		GRAVEL - sandy, some clay, trace silt - brown, dry to moist, frozen		G15		
		SILTY CLAY - sandy - brown, moist - intermediate plasticity		G16	(G16): Gravel: 0.0%, Sand: 33.8%, Silt: 34.7%, Clay: 31.1%	
				G17		
1		- frozen to 0.9 m - firm below 0.9 m				1
				G18		
				G19		
				G20		
2						2
				G21		
3		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.				

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/19/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-12**
LOCATION: Burnell Street, 20 m S of St. Matthews Avenue, East Lane, #834 St. Matthews Avenue		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ▨ SPLIT SPOON ▤ BULK ▨ NO RECOVERY ◧ CORE

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☢ Field Vane ☢ (kPa) 50 100 150 200

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	DEPTH
0		Asphalt (180 mm)				
		GRAVEL - some sand, trace silt, trace clay - brown, dry to moist, frozen	■	G22	(G22): Gravel: 78.8%, Sand: 14.8%, Silt: 5.2%, Clay: 1.2%	
			■	G23		
		CLAY - silty, trace sand - brown, moist - intermediate plasticity	■	G24		
1		- frozen to 0.9 m - firm below 0.9 m	■	G25		1
			■	G26		
			■	G27		
2			■	G28		2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.				
3						

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/19/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-13**
LOCATION: Toronto Street, 25 m N of Portage Avenue, East Lane, Entrance To Office Parkade		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (35 mm) Concrete (170 mm)					
		GRAVEL and CLAY - sandy, trace silt - brown, frozen - low to intermediate plasticity		G29			
		CLAYEY SILT - trace sand - brown, moist - intermediate plasticity		G30			
				G31			
1		- frozen to 0.9 m - firm below 0.9 m		G32		(G32): Gravel: 0.0%, Sand: 8.5%, Silt: 53.8%, Clay: 37.7%	1
				G33			
				G34			
2				G35			2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					
3							

PENETRATION TESTS: ✳ Becker ✳ | ◇ Dynamic Cone ◇ | ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 | ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 | Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + | × QU/2 × | □ Lab Vane □ | △ Pocket Pen. △ | ✠ Field Vane ✠ (kPa) 50 100 150 200

AECOM	LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
	REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/19/16
	PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-14**
LOCATION: Toronto Street, 120 m N of Portage Avenue, West Lane, #271 Toronto Street		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☢ Field Vane ☢ (kPa) 50 100 150 200

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	DEPTH
0		Asphalt (35 mm)				
		Concrete (150 mm)				
		SAND - clayey, some sand, trace gravel - brown, moist, frozen		G36	(G36): Gravel: 4.1%, Sand: 58.3%, Silt: 13.6%, Clay: 24.0%	
		SILTY CLAY - trace sand - brown, moist - intermediate plasticity		G37		
				G38		
1		- frozen to 0.9 m - firm below 0.9 m				1
				G39		
				G40		
				G41		
2						2
				G42		
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.				
3						

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/19/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-15**
LOCATION: Toronto Street, 115 m S of St. Matthews Avenue, East Lane, #301 Toronto Street		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (50 mm)			PENETRATION TESTS: ✳ Becker ✳; ◇ Dynamic Cone ◇; ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100; ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100		
		Concrete (180 mm)			UNDRAINED SHEAR STRENGTH: + Torvane +; × QU/2 ×; □ Lab Vane □; △ Pocket Pen. △; ⛢ Field Vane ⛢ (kPa) 50 100 150 200		
		SILTY CLAY - trace sand - brown, moist - intermediate to high plasticity		G43			
				G44			
				G45			
1		- frozen to 0.9 m - firm below 0.9 m					1
				G46			
				G47			
				G48			
2		- increasing clay content with increasing depth					2
				G49			
3		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/19/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-16**
LOCATION: Toronto Street, 40 m S of St. Matthews Avenue, West Lane, #324 Toronto Street		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ☒ SPLIT SPOON ▬ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		Asphalt (50 mm)					
		Concrete (130 mm)					
		GRAVEL - sandy, clayey - brown, moist, frozen		G50			
		CLAY - trace silt, trace sand - brown, moist - high plasticity		G51			
				G52			
1		- frozen to 0.9 m - firm below 0.9 m		G53			1
				G54			
				G55		(G55): Gravel: 0.0%, Sand: 5.3%, Silt: 8.6%, Clay: 86.1%	
2		- increasing clay content with increasind depth		G56			2
3		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.					

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100; ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ☢ Field Vane ☢ (kPa) 50 100 150 200

AECOM	LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
	REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/19/16
	PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-17**
LOCATION: Boreham Boulevard, 20 m N of Cuthbertson Avenue, East Lane, #317 Boreham Boulevard		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100; ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100	UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ◆ Field Vane ◆ (kPa) 50 100 150 200	COMMENTS	DEPTH
0		Asphalt (25 mm) Concrete (230 mm)						
		CLAYEY SILT - sandy - brown, moist, firm - low plasticity		G99				
				G100				
				G101			(G101): Gravel: 0.0%, Sand: 33.1%, Silt: 53.1%, Clay: 13.8%	
1								1
				G102				
				G103				
				G104				
		- increasing moisture with increasing depth - becoming soft with increasing depth						
2								2
				G105				
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.						
3								

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-18**
LOCATION: Boreham Boulevard, 90 m N of Cuthbertson Avenue, West Lane, #313 Boreham Boulevard		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

PENETRATION TESTS: ✳ Becker ✳ | ◇ Dynamic Cone ◇ | ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 | ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 | Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + | × QU/2 × | □ Lab Vane □ | △ Pocket Pen. △ | ✤ Field Vane ✤ (kPa) 50 100 150 200

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	DEPTH
0		Asphalt (25 mm) Concrete (200 mm)				
		SAND and GRAVEL - silty - brown, dry to moist, frozen		G106		
		SILTY CLAY - trace sand - brown, moist - intermediate plasticity		G107		
				G108		
1		- frozen to 0.9 m - firm below 0.9 m		G109		1
		CLAY - some silt, trace sand - brown, moist, firm - high plasticity		G110	(G110): Gravel: 0.0%, Sand: 3.5%, Silt: 21.1%, Clay: 75.4%	
				G111		
2				G112		2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.				
3						

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-19**
LOCATION: Boreham Boulevard, 100 m S of Corydon Avenue, East Lane, #307 Boreham Boulevard		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ☒ SPLIT SPOON ▬ BULK ⊘ NO RECOVERY ◧ CORE

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⛢ Field Vane ⛢ (kPa) 50 100 150 200

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	DEPTH
0		Asphalt (35 mm)				
		Concrete (200 mm)				
		SAND and SILT - brown, wet, frozen	■	G113		
		SILTY CLAY - trace sand - brown, moist - intermediate plasticity	■	G114		
			■	G115		
1		- frozen to 0.9 m - firm below 0.9 m	■	G116		1
			■	G117		
			■	G118		
2			■	G119		2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.				
3						

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 2	CLIENT: City of Winnipeg	TESTHOLE NO: **TH16-20**
LOCATION: Boreham Boulevard, 25 m S of Corydon Avenue, West Lane, #301 Boreham Boulevard		PROJECT NO.: 60481153
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: 125 mm SSA	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

PENETRATION TESTS: ✳ Becker ✳ | ◇ Dynamic Cone ◇ | ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) | ■ Total Unit Wt ■ (kN/m^3) | Plastic MC Liquid

UNDRAINED SHEAR STRENGTH (kPa): + Torvane + | × QU/2 × | □ Lab Vane □ | △ Pocket Pen. △ | ✤ Field Vane ✤

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	DEPTH
0		Asphalt (50 mm)				
		Concrete (250 mm)				
		CLAYEY SILT - sandy - brown, wet - low to intermediate plasticity		G120		
				G121		
		- frozen to 0.8 m - soft below 0.8 m				
1				G122		1
				G123		
				G124		
		CLAY - some silt, trace sand - brown, moist, firm - high plasticity				
				G125		
2						2
				G126	(G126): Gravel: 0.0%, Sand: 2.4%, Silt: 12.9%, Clay: 84.7%	
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150mm asphalt patch at surface.				
3						

AECOM

LOGGED BY: Matt Lotecki	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Aaron Kaluzniak	COMPLETION DATE: 1/20/16
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE THL_CONTRACT 2_60481153.GPJ UMA WINN.GDT 2/23/16

City of Winnipeg

Local Streets Pkg 16-R-06 – Contract 2

Geotechnical Investigation

Table 01- Summary of Laboratory Soil Testing

Test Hole No.	Testhole Location	Pavement Surface		Pavement Structure Material		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH16-01	Olive Street; 20 m N of Assiniboine Crescent, 2 m E of W Curb, #103 Olive Street	Asphalt	50	None	N/A	SILTY CLAY	0.3	25.5							
						SILTY CLAY	0.6	35.8	0.5	12.2	31.9	55.4	63.6	20.8	42.8
						SILTY CLAY	0.9	34.5							
		Concrete	150			SILTY CLAY	1.2	30.0							
						SILTY CLAY	1.5	27.1							
						SILTY CLAY	1.8	26.4							
						SILTY CLAY	2.1	25.4	0.0	10.6	37.0	52.4	62.6	17.8	44.8
TH16-03	Rowand Avenue (South Leg), at Mount Royal Road, North Lane, #1 Rowand Avenue	Asphalt	50	None	N/A	CLAY	0.3	11.8							
						CLAY	0.6	30.9							
		Concrete	100			CLAY	0.9	34.6							
						CLAY	1.2	34.4	0.0	5.2	16.1	78.7	85.3	22.8	62.5
						CLAY	1.5	36.4							
						CLAY	1.8	37.8							
						CLAY	2.1	43.0							
TH16-04	Rowand Avenue (South Leg), 120 m E of Mount Royal Road, South Lane, #19 Rowand Avenue	Asphalt	35	GRAVEL and SAND	150	SAND/GRAVEL	0.3	10.4	48.1	37.4	10.9	3.6	23.5	18.8	4.7
						CLAY	0.6	32.0							
		Concrete	115			CLAY	0.9	30.6							
						CLAY	1.2	21.8							
						CLAY	1.5	32.8							
						CLAY	1.8	38.8							
						CLAY	2.1	43.0							
TH16-05	Rowand Avenue (South Leg), 230 m E of Mount Royal Road, North Lane, #39 Rowand Avenue	Asphalt	35	GRAVEL	150	GRAVEL	0.3	20.2							
						CLAY	0.6	37.2							
		Concrete	115			CLAY	0.9	35.7							
						CLAY	1.2	33.6							
						CLAY	1.5	36.9							
						CLAY	1.8	40.4							
						CLAY	2.1	44.9							
TH16-07	Rowand Avenue (North Leg), 140 m E of Mount Royal Road, North Lane, #71 Rowand Avenue	Asphalt	35	None	N/A	CLAY	0.3	35.6	0.0	10.6	13.5	75.9	72.5	24.6	47.9
						CLAY	0.6	34.7							
		Concrete	150			CLAY	0.9	32.5							
						CLAY	1.2	33.2							
						CLAY	1.5	35.8							
						CLAY	1.8	40.0							
						CLAY	2.1	45.7							

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Testhole Location	Pavement Surface		Pavement Structure Material		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	quid Limit	Plastic Limit	Plasticity Index
TH16-08	Rowand Avenue (North Leg), at Mount Royal Road, South Lane, #95 Rowand Avenue	Asphalt	N/A	SAND and GRAVEL	300	SAND/GRAVEL	0.3	7.2							
						SAND/GRAVEL	0.6	7.0							
						CLAY	0.9	34.1							
		Concrete	180			CLAY	1.2	35.8							
						CLAY	1.5	36.6							
						CLAY	1.8	38.4							
						CLAY	2.1	35.5							
TH16-09	Burnell Street, 30 m S of St. Paul Avenue, West Lane, Kivalliq Inuit Centre	Asphalt	125	GRAVEL	300	GRAVEL	0.3	12.9							
						CLAY	0.6	35.1							
		Concrete	150			CLAY	0.9	35.3							
						CLAY	1.2	33.6							
						CLAY	1.5	31.3							
						CLAY	1.8	33.8							
						CLAY	2.1	39.6	0.0	1.3	5.8	92.9	89.8	24.7	65.1
TH16-10	Burnell Street, 60 m N of St. Paul Avenue, East Lane, #361 Burnell Street	Asphalt	60	GRAVEL	100	SILTY CLAY	0.3	31.2							
						SILTY CLAY	0.6	29.2							
		Concrete	170			SILTY CLAY	0.9	26.5							
						SILTY CLAY	1.2	24.0							
						SILTY CLAY	1.5	23.9							
						SILTY CLAY	1.8	31.4							
						SILTY CLAY	2.1	24.4							
TH16-11	Burnell Street, 90 m S of St. Matthews Avenue, West Lane, #391 Burnell Street	Asphalt	100	GRAVEL	150	GRAVEL	0.3	21.3							
						SILTY CLAY	0.6	26.6	0.0	33.8	34.7	31.1	33.1	11.7	21.4
		Concrete	180			SILTY CLAY	0.9	19.9							
						SILTY CLAY	1.2	20.5							
						SILTY CLAY	1.5	22.6							
						SILTY CLAY	1.8	38.3							
						SILTY CLAY	2.1	43.7							
TH16-12	Burnell Street, 20 m S of St. Matthews Avenue, East Lane, #834 St. Matthews Avenue	Asphalt	180	GRAVEL	400	GRAVEL	0.3	6.8	78.8	14.8	5.2	1.2	19.7	12.2	5.5
						GRAVEL	0.6	8.7							
		Concrete	N/A			CLAY	0.9	22.0							
						CLAY	1.2	27.8							
						CLAY	1.5	30.2							
						CLAY	1.8	44.8							
						CLAY	2.1	38.5							

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Testhole Location	Pavement Surface		Pavement Structure Material		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH16-13	Toronto Street, 25 m N of Portage Avenue, East Lane, Entrance To Office Parkade	Asphalt	35	GRAVEL and CLAY	250	GRAVEL	0.3	15.7							
						CLAYEY SILT	0.6	27.6							
						CLAYEY SILT	0.9	27.5	0.0	8.5	53.8	37.7	44.3	14.4	29.9
		Concrete	170			CLAYEY SILT	1.2	25.2							
						CLAYEY SILT	1.5	24.0							
						CLAYEY SILT	1.8	21.4							
						CLAYEY SILT	2.1	25.9							
TH16-14	Toronto Street, 120 m N of Portage Avenue, West Lane, #271 Toronto Street	Asphalt	35	SAND	250	SAND	0.3	24.6	4.1	58.3	13.0	24.0	28.8	11.0	17.8
						SILTY CLAY	0.6	34.6							
		Concrete	150			SILTY CLAY	0.9	33.7							
						SILTY CLAY	1.2	34.3							
						SILTY CLAY	1.5	39.6							
						SILTY CLAY	1.8	39.8							
						SILTY CLAY	2.1	43.7							
TH16-15	Toronto Street, 115 m S of St. Matthews Avenue, East Lane, #301 Toronto Street	Asphalt	50	None	N/A	SILTY CLAY	0.3	31.5							
						SILTY CLAY	0.6	21.8							
		Concrete	180			SILTY CLAY	0.9	18.9							
						SILTY CLAY	1.2	24.8							
						SILTY CLAY	1.5	29.8							
						SILTY CLAY	1.8	44.1							
						SILTY CLAY	2.1	48.3							
TH16-16	Toronto Street, 40 m S of St. Matthews Avenue, West Lane, #324 Toronto Street	Asphalt	50	GRAVEL	150	CLAY	0.3	18.9							
						CLAY	0.6	29.6							
		Concrete	130			CLAY	0.9	32.3							
						CLAY	1.2	26.1							
						CLAY	1.5	29.0							
						CLAY	1.8	43.0	0.0	5.3	8.6	86.1	95.7	25.3	70.4
						CLAY	2.1	48.2							
TH16-17	Boreham Boulevard, 20 m N of Cuthbertson Avenue, East Lane, #317 Boreham Boulevard	Asphalt	25	None	N/A	CLAYEY SILT	0.3	9.3							
						CLAYEY SILT	0.6	21.7							
		Concrete	230			CLAYEY SILT	0.9	17.2	0.0	33.1	53.1	13.8	22.7	13.8	8.9
						CLAYEY SILT	1.2	17.6							
						CLAYEY SILT	1.5	20.1							
						CLAYEY SILT	1.8	22.3							
						CLAYEY SILT	2.1	33.6							

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Testhole Location	Pavement Surface		Pavement Structure Material		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH16-18	Boreham Boulevard, 90 m N of Cuthbertson Avenue, West Lane, #313 Boreham Boulevard	Asphalt	25	SAND and GRAVEL	75	SILTY CLAY	0.3	20.8							
						SILTY CLAY	0.6	18.6							
						SILTY CLAY	0.9	17.6							
		Concrete	200			SILTY CLAY	1.2	25.8							
						CLAY	1.5	32.5	0.0	3.5	21.1	75.4	76.1	21.0	55.1
						CLAY	1.8	42.1							
						CLAY	2.1	44.4							
TH16-19	Boreham Boulevard, 100 m S of Corydon Avenue, East Lane, #307 Boreham Boulevard	Asphalt	35	SAND and SILT	50	SILTY SAND	0.3	24.4							
						SILTY CLAY	0.6	22.9							
		Concrete	200			SILTY CLAY	0.9	31.0							
						SILTY CLAY	1.2	33.6							
						SILTY CLAY	1.5	33.4							
						SILTY CLAY	1.8	27.9							
						SILTY CLAY	2.1	48.6							
TH16-20	Boreham Boulevard, 25 m S of Corydon Avenue, West Lane, #301 Boreham Boulevard	Asphalt	50	None	N/A	CLAYEY SILT	0.3	24.9							
						CLAYEY SILT	0.6	26.0							
		Concrete	250			CLAYEY SILT	0.9	23.1							
						CLAYEY SILT	1.2	21.5							
						CLAYEY SILT	1.5	22.7							
						CLAY	1.8	34.7							
						CLAY	2.1	38.8	0.0	2.4	12.9	84.7	91.1	26.7	64.4

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Photograph 1. Olive Street – TH16-01

Photograph 2. Rowand Avenue – TH16-03

Photograph 3. Rowand Avenue – TH16-04

Photograph 4. Rowand Avenue – TH16-05

Photograph 5. Rowand Avenue – TH16-07

Photograph 6. Rowand Avenue – TH16-08

Photograph 7. Burnell Street – TH16-09

Photograph 8. Burnell Street – TH16-10

Photograph 9. Burnell Street – TH16-11

Photograph 10. Burnell Street – TH16-12

Photograph 11. Toronto Street – TH16-13

Photograph 12. Toronto Street – TH16-14

Photograph 13. Toronto Street – TH16-15

Photograph 14. Toronto Street – TH16-16

Photograph 15. Boreham Boulevard – TH16-17

Photograph 16. Boreham Boulevard – TH16-18

Photograph 17. Boreham Boulevard – TH16-19

Photograph 18. Boreham Boulevard – TH16-20